REPORT ON
AIR AND WATER POLLUTION CONTROL
FOR THE
OHIO RUBBER COMPANY

July 25, 1974

Product and Process Control

The malodor problem may be approached from two different directions: the removal of reclaiming odors and process control to minimize odor produced. The latter category involved the reclaim processes and the associated odors. As previously described in Chapter II, the odors originate upon the blending of reclaim oils with the buffings, and the reheating of devulcanized rubber as illustrated by the beaker mills and strainer. It leads one to believe that the odors are a function of reclaim oils and process temperature.

The reclaim oils being purchased by Ohio Rubber Company are listed and described in Table 3-1, and supplied by five distributors: T. P. Long Chemical Company, Pitt-Consol Chemical Company, Mobile Rosin Oil Company, C. P. Hall Company, and Crowley Hydrocarbon Chemicals, Inc.

For the past two years, the reclaim rubber utilizes the oils composed of tall oil pitch and aromatic solvent (xylol). A peptizing agent (aryl disulfides), which reacts as a pseudo-catalyst to produce the digestion time, is proportioned (1 : 25) with the above-mentioned oils. The reclaim oil mixture and rubber is blended at a ratio 1 : 3.6 for high grade and 1 : 7.2 for low grade stock, prior to devulcanization.

During the process of reclaiming rubber at elevated temperatures, the odors arise from the vaporization of these oils. The aromatic compounds, such as xylol and dipentene are more prevailing tar or rosin, but all compose the odorous environment. Since pine tar and rosin are readily removed by chemical oxidation, the aromatics seem to be the organics which are insoluble in water and refuse to become oxidized in the presence of potassium permanganate.

For the duration of one week, the S-256 reclaim oil was replaced by S-229, which contained 35% limonene (dipentene). The

Table 3-1

Reclaiming Oils

Distributor	ORCO Code	Composition
T. P. Long Chemical Company	S-256	Tall Oil Rosin Pitch Saponifiable Esters Fatty Acid Derivatives Hydrogenated Xylene
Pitt-Consol Chemical	S-253	Active Ingredient: Aryl Disulfides
Mobile Rosin Oil Company	S-254	Pine Tar Resin Rosin Acids Fatty Acids Polyterpenes Aromatic Hydrocarbons (Xylol)
C. P. Hall Company	S-229	Tall Oil Pitch Terpene Hydrocarbons Alpha, Beta, Pinene Cineole Limonene, p-cymene
Crowley Hydrocarbons Chemicals, Inc.	S-250	Tall Oil Derivatives Rosin, Rosin Esters Fatty Acids Aromatic Hydrocarbons (Terpene)

xylol-based solvent was temporarily replaced with dipentene since the devulcanization of rubber is more efficient with terpene, monocyclic hydrocarbons, as well as unsaturated terpenes are more reactive than aromatics. During the trial period, the process odors were more obnoxious and caustic than the ones experienced with the xylo-reclaim oil. Pilot studies during this period included the operation of the chemical oxidation system, as well as carbon adsorption.

The results with respect to the chemical system are given in Table 3-2. During the dipentene period, the packed tower functioned within the optimum parameters as defined within the preliminary report, and removed only a fraction of the piloted odors. The treated airstream was not as obnoxious in comparison to xylo-based solvents, but the magnitude of the discharge odor was greater. At the present time, the use of dipentene oils should be abandoned unless the economics of other oils dictate a change.

During trial period with the dipentene oils, the carbon adsorption system was started, and the corresponding results are to be presented in a following section.

Table 3-10

Analytical Composition of Blowdown Condensate

CONSTITUENT		SAMPLE I	SAMPLE II	SAMPLE III
Total Coliform - 100 ml		0	0	0
Total Solids	mg/L	---	338	291
Total Sus. Solids	"	--	3	4
Total Dis. Solids	"	--	335	287
Total Vol. Solids	"	--	150	136
Dissolved Oxygen	"	0.0	0.3	0.5
Residue	"	--	188	155
Total BOD	"	1400	2300	2300
Total COD	"	4800	7900	15000
Turbidity - Jackson Units	"	344	736	760
Color Units	"	7	2	2
Specific Conductance Micromhos	"	--	490	430
pH at 25°C	"	6.70	6.75	6.80
Alkalinity as $CaCO_3$	"	--	110	104
Nitrogen, Total	"	--	14	11
Nitrogen, Organic	"	--	1.2	0.8
Ammonia as N	"	--	12	9
Nitrite as N	"	--	< 1.0	< 1.0
Nitrate as N	"	--	1.0	1.0
Phosphorous, Total	"	--	< 0.05	< 0.05
PO_4, Ortho	"	--	< 0.05	< 0.05
SO_4	"	--	61	65
Cl	"	--	39	39
Zn	"	--	0.04	0.04
Carbon, Tot. Org.	"	1120	3550	2000
Phenol	"	3.2	2.4	1.9
Oil-Grease	"	88	84	144